

DESIGN RESEARCH :

Project Description

The Design project proposes for a child environmental learning center in the city of Al Ain to fulfill this need. The center should provide for an interactive experience which allows children to explore multiple strategies to save the environment through display as well as building design. Ubiquitous surfaces, transparent service walls and floors, as well as revelation of building technologies are examples. The building will be located downtown Al Ain, in Al Jimi area, behind Al Jimi Mall as illustrated in the map attached.



MAIN ISSUES

Main Issues	
Architectural	Activity centers appropriately sized for the activity
Circulation	Circulation paths, separate from the activity centers
Spatial	Room dividers, furniture, and level changes to divide the activity centers from each other <ul style="list-style-type: none"> - Activity centers physically and visually enclosed and separate from each other
Connection	<ul style="list-style-type: none"> - Are the activity centers visually accessible to each other? Children can see play opportunities.
Scale	Appropriate scale helps develop competency and self-esteem. Challenges are appropriate to developmental stage and children age.

SITE FACTOR ANALYSIS

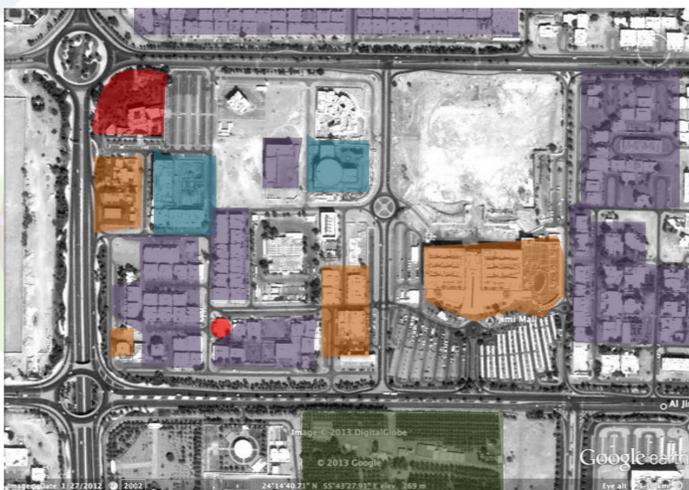
ACCESSIBILITY & VISIBILITY



- Main Road
- Access to site
- Our site

- The site is visible only from one main road, and two secondary road that leads to commercial buildings.
- The site can be accessed from to sides. One from the main road or an external access and the other is internally accessible.
- The site is mainly visible from the traffic light.

PHYSICAL CONTEXT



- Commercial
- Residential
- Agriculture
- Mosque
- Medical

- The site is surrounded by different types of buildings.
- Mostly residential buildings occupy the site which can be considered as safe.
- Two main commercial buildings are highly accessible Jimi mall and Al-Amal Bakery that are close to the site.

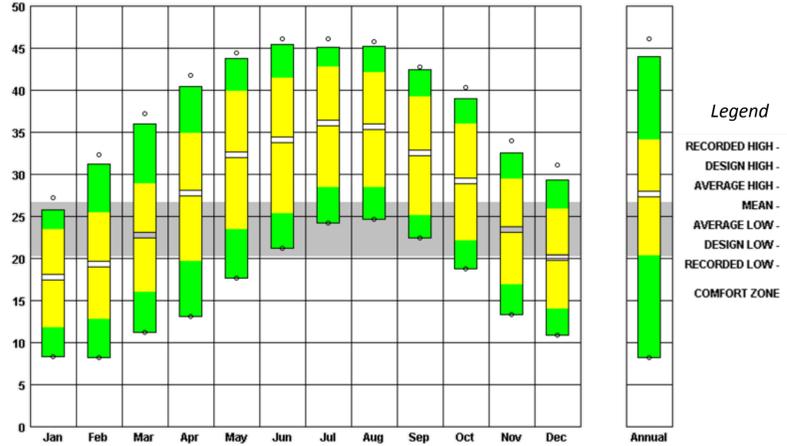
ENVIRONMENTAL ANALYSIS

Weather Data Summary

MONTHLY MEANS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Global Horiz Radiation (Avg Hourly)	437	468	571	531	613	576	520	562	553	567	479	408
Direct Normal Radiation (Avg Hourly)	499	386	482	374	464	392	314	407	442	546	542	460
Diffuse Radiation (Avg Hourly)	163	220	229	254	255	271	273	253	232	201	167	163
Global Horiz Radiation (Max Hourly)	772	869	951	996	981	982	975	972	954	900	803	715
Direct Normal Radiation (Max Hourly)	940	901	873	780	740	744	687	747	842	876	937	945
Diffuse Radiation (Max Hourly)	353	406	434	500	474	521	521	509	485	396	371	336
Global Horiz Radiation (Avg Daily Total)	4015	4343	5704	5898	6872	6491	5847	6261	5865	5337	4424	3732
Direct Normal Radiation (Avg Daily Total)	4720	3719	4959	4202	5299	4536	3601	4584	4765	5299	5098	4281
Diffuse Radiation (Avg Daily Total)	1529	2080	2325	2847	2900	3095	3101	2856	2496	1942	1573	1513
Global Horiz Illumination (Avg Hourly)	47380	51151	62312	57952	66883	63298	57999	61991	60739	61886	52068	44259
Direct Normal Illumination (Avg Hourly)	46477	36510	46242	36023	45065	37722	29775	38398	41520	52275	50604	42504
Dry Bulb Temperature (Avg Monthly)	17	19	22	27	32	34	36	35	32	29	23	20
Dew Point Temperature (Avg Monthly)	10	10	10	8	9	12	16	16	15	12	12	11
Relative Humidity (Avg Monthly)	64	57	47	31	26	28	32	33	37	38	52	58
Wind Direction (Monthly Mode)	310	320	300	300	50	350	30	340	0	320	320	340
Wind Speed (Avg Monthly)	3	3	4	4	4	4	4	4	3	3	3	3
Ground Temperature (Avg Monthly of 3 Depths)	24	21	21	21	23	26	29	31	33	32	30	27

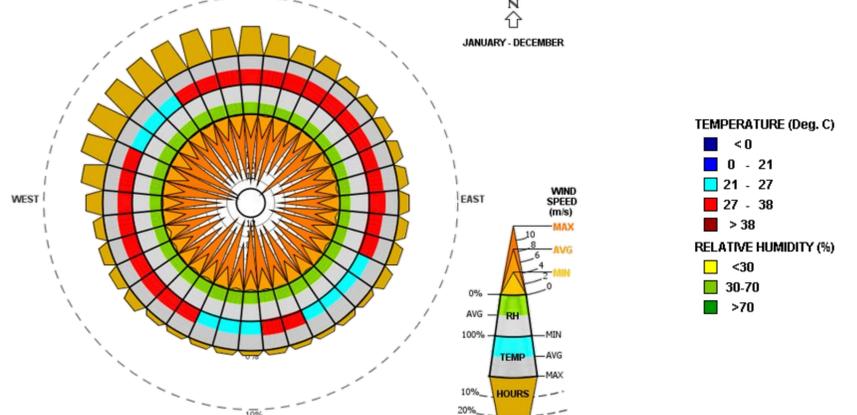
- The figure above shows the direct and normal radiation of the sun average hourly for each month.
- The figure above shows the direct and normal radiation of the sun average daily for each month.

Temperature range



- The figure above shows the temperature range for each month, the grey shade is the comfort zone.
- It indicates that during November to March the average temperature is close and below to the comfortable zone which means the weather is cool.
- However, From April to October the average temperature is above the comfortable zone which means the weather is hot.

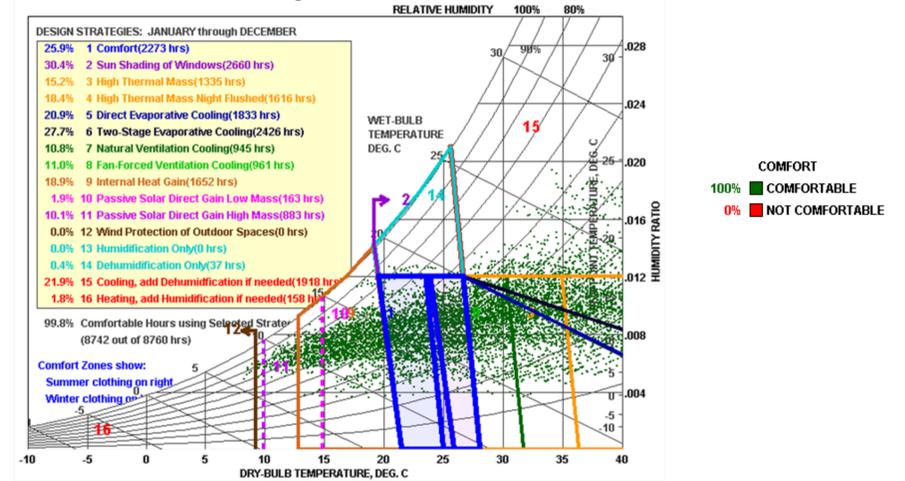
Wind Wheel



- The highest percentage of wind is 5% in the direction of Northwest (brown).
- The temperature of the wind is very high (hot) at north and northeast, as well as west and southwest (red).
- The wind temperature is comfortable in the southeast and northwest (cyan).
- The humidity in Al-Ayn is considered as comfortable (light green).
- The highest wind velocity is in the northeast, however the speed can be considered the same in all directions (three triangles)

Psychometric Chart

ASHRAE standard 55-2004 using PMV



- The best single cooling design strategy is sun shading which accounts for 30.4% of the hours.
- The next most effective cooling strategy is the two stage evaporative cooling which accounts for 27.7% of the hours

SITE TOTAL AREA



Total Area : 90539.9 m²
Setback = 3 m
Area after setback = 87129.5 m²

Build area = 70%

Area to build in = 60990.6 m²

- According to our site the building should be built 3m away from all directions (setback) and the allowable building area would be 60990.6 m²

REGION SELECTION

Criteria	Reason
Building orientation	To achieve natural ventilation and evaporative cooling
Building accessibility	The building can be accessible from the northeast direction, which allows to have the parking lots on the right side not to distract the front view of the building
Building view (Visibility)	The building is visible from two roads, to show the different environmental strategies used
Building aesthetics	A corner view of the building shows the different levels/ inclination of the roofing

